

Statement of Kit Batten, Ph.D.
Science Advisor in the Office of the Deputy Secretary
U.S. Department of the Interior

**Legislative Hearing: S. 1013, the Department of Energy Carbon Capture and
Sequestration Program Amendments Act of 2009**
U.S. Senate Energy and Natural Resources Committee

May 14, 2009

Introduction

Mr. Chairman and Members of the Committee, thank you for the opportunity to be here today to discuss S. 1013, the Department of Energy Carbon Capture and Sequestration Program Amendments Act of 2009. I also will discuss the forthcoming Department of the Interior Report to Congress: Framework for Geological Carbon Sequestration on Public Land, created in compliance with section 714 of the Energy Independence and Security Act of 2007 (EISA).

I am Kit Batten, Science Advisor in the Office of the Deputy Secretary of the Department of the Interior. This position was created at the beginning of this administration because Secretary Salazar strongly feels that our future – as a Department and as a nation – is inextricably linked to our understanding, through science, of the world around us.

S. 1013 calls for the Secretary of Energy to carry out a program to demonstrate the commercial application of integrated systems for long-term geological storage of carbon dioxide. The Department of the Interior has not had an opportunity to fully analyze S. 1013, and therefore, cannot take a position on the bill at this time. However, the Department supports the need for large-scale demonstrations to address key questions surrounding long-term carbon storage. Additionally, the Department supports the requirement of science-based monitoring and verification of the injected carbon dioxide plume throughout the life of the project to beyond the closure phase. The Department, through our on-the-ground land managers and scientists, believes we could offer a significant value added to these efforts.

The Role of the Bureau of Land Management and the U.S. Geological Survey

As the Nation's largest land manager, the Bureau of Land Management (BLM) is entrusted with the multiple-use management of 258 million acres of land, and administers 700 million acres of sub-surface mineral estate of which the surface owners are Federal agencies, states, or private entities. Of the 1.2 billion acres inventoried by the U.S. Geological Survey (USGS) in its National Oil and Gas Assessment, 279 million acres are under Federal management. The Department diligently executes our responsibilities to make these resources available in an environmentally-sound manner. Within the framework of a transparent public process, we carefully consider habitat, groundwater, air and other resources; mitigate impacts through best management practices, stipulations and conditions of approval; and balance development with other uses across the landscape.

All of these considerations remain consistent as the Department contemplates our role in the use of public lands to sequester carbon.

Challenges of Addressing Geologic Carbon Storage

The challenges of addressing carbon dioxide accumulation in the atmosphere are significant. A variety of strategies are being investigated to reduce emissions and remove carbon dioxide from the atmosphere. Such strategies include the facilitated capture and storage of carbon dioxide through sequestration using plants, or by physical capture from major sources and injection into geologic formations.

The Department of the Interior has a long history with injecting carbon dioxide into geologic formations. Carbon dioxide injection techniques have useful practical applications in processes known as enhanced oil recovery (EOR), which currently take place on some public lands managed by the BLM. These processes allow the recovery of additional energy resources from older oil and gas fields.

EOR's use of carbon dioxide injection will continue to yield valuable data and information that will facilitate future efforts to effectively capture and sequester carbon dioxide in geologic formations found on public lands. A critical issue for evaluation of storage capacity is the integrity and effectiveness of formations for sealing carbon dioxide underground, thereby preventing its release into underground sources of drinking water, mineral resources, or the atmosphere. Current EOR efforts will enhance our understanding of these types of critical scientific and geologic issues. The Department expects that new information on these issues will continue to be generated from activities on BLM-managed lands. As such, we anticipate the need for the BLM to play a leadership role in collaborating with other Federal agencies, tribes, states, the private sector, and public interest groups as we move forward in addressing legal and policy issues that arise during development.

Carbon Capture and Sequestration (CCS)

The current atmospheric carbon dioxide concentration is approximately 380 parts per million and rising at a rate of approximately 2 parts per million annually, according to the most recent information from the Intergovernmental Panel on Climate Change (IPCC). The 2005 IPCC Special Report on *Carbon Dioxide Capture and Storage* concluded that in emissions reductions scenarios striving to stabilize global atmospheric carbon dioxide concentrations at targets ranging from 450 to 750 parts per million, the global storage capacity of geologic formations may be able to accommodate most of the captured carbon dioxide. However, the extent to which this storage capacity is economically viable depends on the price of carbon. Also, geologic storage capacity may vary widely on a regional and national scale. A more refined understanding of geologic storage capacity is needed to address these knowledge gaps.

Geological storage of carbon dioxide in subsurface rocks involves injection of carbon dioxide into the pore space of permeable rock units. This principle operates in all types of potential geological storage formations such as oil and gas fields, deep saline water-bearing formations, or coal beds. Most of the potential carbon dioxide storage capacity in the U.S. is in deep saline formations.

Carbon Capture and Sequestration (CCS) – DOI’s Management Role

The BLM’s existing administrative and regulatory framework will help facilitate future carbon sequestration demonstration projects and potentially, leasing geologic storage capacity. In addition to experience in administering a large-scale mineral leasing program, the agency has the realty expertise and an existing framework for issuing rights-of-way on public land that could serve future needs for carbon dioxide pipelines across public lands. Other programmatic and land management expertise, such as the BLM’s experience in evaluation of potential environmental impacts of projects, will facilitate this effort. In addition, the USGS will also play an important role in recommending geologic criteria that could be incorporated into a set of “best practices” for geologic site selection.

The USGS released to the public and interested parties a new probabilistic assessment methodology for evaluation of carbon dioxide storage. Use of the methodology can help us identify the best places in the country to use geologic carbon sequestration and is an important step in understanding how much carbon dioxide can be stored underground.

A number of challenges will need to be addressed moving forward, and we must make use of current information to inform future discussions. For example, the Department has the results of research at international non-EOR sites at which large quantities of CO₂ have been injected for as long as 12 years. These sites have operated safely and shown no sign of leakage. We believe that the DOI land managers and scientists who are on the ground have expertise to offer on monitoring carbon sequestration and we would like to work with the Committee to facilitate inter-agency coordination.

Energy Independence and Security Act Carbon Capture Provisions

Relating to section 711 of the Energy Independence and Security Act (EISA; Public Law 110-140), the USGS, as mentioned above, recently completed a draft methodology to assess geologic CO₂ storage resources with input from DOE, EPA, state geological surveys, and others. Currently, the USGS is in the process of assembling review comments and expert evaluations of the methodology so that it can be finalized. The USGS plans to apply this methodology in a national assessment of geologic storage resources in depleted oil and gas fields and saline formations. The initial stages of this assessment are funded in the President’s Budget for Fiscal Year 2010.

Section 713 of EISA directs the BLM to maintain records on, and an inventory of, the quantity of carbon dioxide stored within Federal mineral leaseholds. The BLM is currently implementing the carbon capture and storage provisions of the EISA and is nearing completion of an initial inventory of carbon dioxide stored within Federal lands up to the end of Fiscal Year 2008 and will update this inventory annually.

Framework for Geological Carbon Sequestration on Public Lands Report

Section 714 of the EISA directs the Secretary of the Interior to submit a report to Congress containing a recommended framework for geological sequestration on public lands. This report is expected to be released in the near future. Through the BLM, in coordination with the USGS,

the Environmental Protection Agency, the Department of Energy, and other appropriate agencies, the Department examined criteria for identifying candidate geological sequestration sites in several specific types of geological settings. Additionally, the BLM reviewed the Interstate Oil and Gas Compact Commission's model regulations for carbon capture and sequestration to determine if they are applicable to public lands or could serve as a model for the requirements contained in Section 714 of EISA.

In reviewing these model regulations, the BLM considered the following criteria and objectives:

- Criteria for identifying candidate geological sequestration sites in several specific types of geological settings;
- A proposed regulatory framework for the leasing of public land or of an interest in public land for the long-term geological sequestration of carbon dioxide;
- A procedure for ensuring any geological carbon sequestration activities on public land provide for public review and protect the quality of natural and cultural resources;
- If appropriate, additional legislation that may be required to ensure that public land management and leasing laws are adequate to accommodate the long-term geological sequestration of carbon dioxide; and
- If appropriate, additional legislation that may be required to clarify the appropriate framework for issuing rights-of-way for carbon dioxide pipelines on public land.

The report also will describe the status of Federal leasehold or Federal mineral estate liability issues related to the release of carbon dioxide stored underground in public land, including any relevant experience from enhanced oil recovery using carbon dioxide on public lands. In addition, the report will identify issues specific to the issuance of pipeline rights-of-way on public land, and legal and regulatory issues specific to carbon dioxide sequestration on split-estate lands, where title to mineral resources is held by the United States, but title to the surface estate is not.

Regulatory Issues

At this early stage in the development of carbon dioxide storage technologies, especially in the absence of large-scale demonstration projects of more than 1 million tons of carbon dioxide per year, many unknown factors may impact the development of a regulatory framework and best management practices.

A proposed regulatory framework must recognize carbon dioxide as a commodity, resource, contaminant, waste and pollutant. Any regulatory or management regime adopted for CO₂ should accommodate all these realities. For instance, the geologic sequestration of CO₂ should distinguish between the sequestration of pure CO₂ and CO₂ mixed with other gases such as hydrogen sulfide, carbon monoxide, methane, and oxides of nitrogen and sulfur. These impurities have the potential to impact the economics, technical feasibility, location preferences, land use planning requirements, environmental impact mitigation, multiple-resource conflict potential, and regulatory oversight of geologic CO₂ sequestration. In this regard, DOI recognizes that the EPA has issued a proposed rule regarding carbon sequestration and storage and intends to coordinate as necessary as the EPA rule is finalized.

Carbon sequestration may potentially conflict with other land uses including existing and future mines, oil and gas fields, coal resources, geothermal fields, and drinking water sources. In addition to the existing geophysical and scientific barriers to commercial carbon sequestration, a proposed statutory and regulatory framework must recognize the long-term liability of any permitting decision to sequester CO₂ and the required commitment for stewardship of facilities over an extended period of time. The scope of liability and term of stewardship will be among the longest ever attempted, lasting up to hundreds of years or more. Relevant experiences from enhanced oil recovery using carbon dioxide on public lands can assist in examining this issue.

Lastly, geological carbon sequestration on split estate lands or lands where the surface is managed by other Federal agencies presents other complications due to ownership issues of pore space and limitations that may need to be placed on surface and subsurface uses to ensure integrity of storage.

S. 1013

S. 1013 directs the Secretary of Energy to carry out a program to demonstrate commercial application of integrated systems for long-term geological storage of carbon dioxide. The goal of this carbon storage program is to provide financial and technical assistance of up to 10 large-scale carbon dioxide storage projects.

The Department of the Interior supports DOE's work in conducting large-scale carbon storage demonstrations. Additionally, we support efforts to ensure science-based monitoring and verification of the injected carbon dioxide plume throughout the life of a project to beyond the closure phase. It must be recognized that effective risk management of any geologic sequestration decisionmaking and regulation of consequent activity is limited by the current state of the art of scientific assessment, monitoring, measurement, verification, and mitigation of any potential undesirable consequences occurring on or beneath the surface of the land. Additional investment in ongoing scientific and engineering research will be essential as geological sequestration is a rather new option to reduce greenhouse gas emissions.

Currently, the Department is reviewing the legislation in greater detail and we look forward to working with the Committee on these issues in the future.

Conclusion

Addressing the challenge of reducing atmospheric carbon dioxide and understanding the effect of global climate change is a complex issue with many interrelated components. The assessment activities called for in EISA should ultimately increase the information base upon which decision makers will rely as they deal with these issues. It is clear that the discussion on this subject will continue and the Department stands ready to assist Congress as it examines these challenges and opportunities.

S. 1013 addresses key issues – long-term liability, monitoring, and stewardship - that must be resolved in any regulatory framework for carbon sequestration. The Department supports the goals of S. 1013 but has not had time to fully analyze the bill and establish a position on specific

provisions. We look forward to working together to resolve outstanding legal and policy questions as we continue to learn more about the technologies and geologic information necessary in moving forward with a carbon sequestration program.

Thank you for the opportunity to present this testimony. I am pleased to answer questions you and other Members of the subcommittee might have.